

Document 00910

ADDENDUM NO. 1

Date of Addendum: 4/18/15

PROJECT NAME: Southwest Pump Station Improvements Package II

PROJECT NO: WBS No. S-001000-0047-4

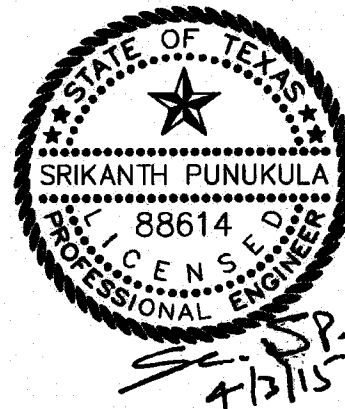
BID DATE: April 9, 2015 (There is no change to the Bid Date)

FROM: James T. Lincoln, P.E., City Engineer
City of Houston, Department of Public Works and Engineering
611 Walker Street, 15th Floor
Houston, Texas 77002
Attn: Rajinder Singh, P.E., Project Manager

TO: Prospective Bidders

This Addendum forms a part of the Bidding Documents and will be incorporated into the Contract documents, as applicable. Insofar as the original Project Manual and Drawings are inconsistent, this Addendum governs.

This Addendum uses the change page method: remove and replace or add pages, or Drawing sheets, as directed in the change instructions below. Change bars (|) are provided in the outside margins of pages from the Project Manual to indicate where changes have been made; no change bars are provided in added Sections. Reissued Drawing Sheets show the Addendum number below the title block and changes in the Drawing are noted by a revision mark and enclosed in a revision cloud.



KIT Professionals, Inc.
TBPE Registration No. F-4997

CHANGES TO PROJECT MANUAL

BIDDING REQUIREMENTS

1. Document 00010 – Table of Contents. Remove and replace Page 00010-10. Section 16402 added to the Table of Contents.
2. Document 00410 – Bid Form. Remove and replace entire document. Additional bid supplement documents listed in 00410A. Base Bid Item 2 description revised to add "paint exterior doors" and "plumbing". Base Bid Item 3 description revised to add "plumbing". Estimated Quantity added to Base Bid Item 6. Extra Unit Price Item for new fire alarm system added and horizontal bar added to all Extra Unit Price items under Unit Price column.
3. Document 01110 – Summary of Work. Remove and replace entire document. Paragraph 1.03.B.15 is added on Page 01110-4 for the Extra Unit Price Item for new fire alarm system.

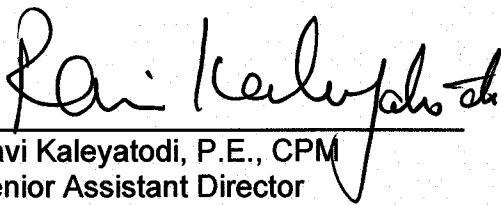
SPECIFICATIONS

1. Section 16111 – Conduits, Fittings, and Bodies. Replace Pages 16111-5 and 16511-6. Paragraphs A, B, and C of Section 3.02 revised.
2. Section 16402 – Underground Duct Banks. This new section is added.

CHANGES TO DRAWINGS

1. Sheet 9 of 67, Remove and replace entire sheet.
2. Sheet 10 of 67, Remove and replace entire sheet.
3. Sheet 22 of 67, Remove and replace entire sheet.
4. Sheet 27 of 67, Remove and replace entire sheet.

END OF ADDENDUM NO. 1


Ravi Kaleyatodi, P.E., CPM
Senior Assistant Director
Engineering Branch
Engineering and Construction Division

DATED: 4/3/15

END OF DOCUMENT

00910-2
02-01-2004

<u>Doc. No.</u>	<u>Document Title</u>	<u>Doc. Date</u>
16120	600-VOLT BUILDING WIRE AND CABLE	06-28-2005
16121	600-VOLT CONTROL CABLE	06-28-2005
16122	600-VOLT POWER CABLE	06-28-2005
16123	MEDIUM VOLTAGE POWER CABLE	06-28-2005
16125	THERMOCOUPLE EXTENSION CABLE.....	06-28-2005
16126	INSTRUMENTATION CABLE	06-28-2005
16131	DEVICE, PULL AND JUNCTION BOXES	01-01-2010
16140	WIRING DEVICES	06-28-2005
16160	CABINETS AND ENCLOSURES	06-28-2005
16165	DISCONNECT SWITCHES.....	01-01-2010
16170	GROUNDING AND BONDING.....	06-28-2005
16171	LOW VOLTAGE ELECTRIC MOTORS.....	06-28-2005
16195	ELECTRICAL IDENTIFICATION.....	01-01-2010
16402	UNDERGROUND DUCT BANKS	01-01-2010
16484	ELECTRONIC SOFT-START CONTROLLERS.....	01-01-2010
16640	CATHODIC PROTECTION FOR PIPELINES.....	01-01-2011

END OF DOCUMENT

Document 00410A

BID FORM – PART A

To: **The Honorable Mayor and City Council of the City of Houston
City Hall Annex
900 Bagby Street
Houston, Texas 77002**

Project: Southwest Pump Station Improvements Package II

Project No.: WBS No. S-001000-0047-4

Bidder: _____

(Print or type full name of proprietorship, partnership, corporation, or joint venture.)

1.0 OFFER

- A. **Total Bid Price:** Having examined the Project location and all matters referred to in Bid Documents for the Project, we, the undersigned, offer to enter into a Contract to perform the Work for the Total Bid Price shown on the signature page of this Document
- B. **Security Deposit:** Included with the Bid is a Security Deposit in the amount of 10 percent of the Total Bid Price subject to terms described in Document 00200 – Instructions to Bidders.
- C. **Period for Bid Acceptance:** This offer is open to acceptance and is irrevocable for 90 days from Bid Date. That period may be extended by mutual written agreement of the City and Bidder.
- D. **Addenda:** All Addenda have been received. Modifications to Bid Documents have been considered and all related costs are included in the Total Bid Price.
- E. **Bid Supplements:** The following documents are attached:
 - ☒ Security Deposit (*as defined in Document 00200 – Instructions to Bidders*)
 - ☒ Document 00450 - Bidder's Statement of MWBE/PDBE/DBE/SBE Status
 - ☒ Document 00452 - Contractor's Submission List - Fair Campaign Ordinance Form A
 - ☒ Document 00453 – Bidder's Statement of Residency (*not required for AIP funded project*)
 - ☒ Document 00454 - Affidavit of Non-interest
 - ☒ Document 00455 - Affidavit of Ownership or Control
 - ☐ Document 00456 - Bidder's Certificate of Compliance with Buy American Program (*required for AIP funded project*)
 - ☒ Document 00457 – Conflict of Interest Questionnaire (CIQ)
 - ☐ Document 00458 - Bidder's Certificate Regarding Foreign Trade Restriction (*required for AIP funded project*)
 - ☐ Document 00459 - Contractor's Statement Regarding Previous Contracts Subject to EEO (*required for AIP funded project*)
 - ☒ Document 00460 – (POP 1) Pay or Play Acknowledgement Form
 - ☐ Document 00470 – Bidder's MWSBE Participation Plan

- ☒ Document 00471 – Pre-bid Good Faith Efforts (*required if the goal in Bidder's Participation Plan–Document 00470 is lower than the Goal*).
- ☒ Document 00472 – Bidder's Goal Deviation Request (*required if the goal in Bidder's Participation Plan–Document 00470 is lower than the Goal*).
- ☒ Others as listed: Valid official letter from OBO with your designation as a City or Local Business (Bidder's Participation Hire Houston First)

2.0 CONTRACT TIME

If offer is accepted, Contractor shall achieve Date of Substantial Completion within 365 days after Date of Commencement of the Work, subject to adjustments of Contract Time as provided in the Contract.

Document 00410B

BID FORM – PART B

1.0 TOTAL BID PRICE HAS BEEN CALCULATED BY BIDDER, USING THE FOLLOWING COMPONENT PRICES AND PROCESS (PRINT OR TYPE NUMERICAL AMOUNTS):

A. STIPULATED PRICE: **\$0.00 (N/A)**
(Total Bid Price; minus Base Unit Prices, Extra Unit Prices, Cash Allowances and All Alternates, if any)

B. BASE UNIT PRICE TABLE:

Item No.	Spec Ref.	Base Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in figures
1	01502	Mobilization	LS	1	\$90,000 ⁽¹⁾	\$90,000.00 ⁽¹⁾
2	01110	Replacement of existing rolled linoleum/VCT flooring with new terrazzo cast in-situ flooring with integrated terrazzo cove base, paint walls with premium quality latex paint, paint exterior doors, new ceiling tiles, new lighting, plumbing, new AC system, electrical and mechanical relocations in office, control room and switch gear rooms as shown on the contract drawings and as specified	LS	1		
3	01110	Construction of generator switchgear enclosures as shown on the contract drawings as specified, including but not limited to demolition of exterior wall and louvers, new dry wall, new ceiling, new lighting, new louvers, plumbing, new A/C system, electric service, and ancillary components for a complete in place and operating system	LS	1		
4	01110	Emergency Eyewash/shower as shown on drawings and specified including plumbing for a complete in place and an operating system	LS	1		

Item No.	Spec Ref.	Base Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in figures
5	01110	Construction of Ammonia feed System improvements as shown on the contract drawings and specified, including but not limited to, all site preparation, excavation, protection of existing structures, backfill, compaction, removal of old ammoniator and appurtenances, installations of three (3) new ammoniators, one (1) new booster pump, two (2) magnetic flow meters, pipe fittings, pipe supports, valves, wall penetrations, instruments, protective coatings, electrical, instrumentation, metal fabrications, removal and replacement of two (2) FRP ammonia storage tanks including concrete saddles and associated piping, removal of two (2) ammonia day tanks and demolition of foundations, re-installation of two (2) ammonia day tanks including new foundations, applying protective coatings to tank foundations, existing trenches and floor to an extent as indicated on the contract drawings, removal and replacement of ammonia feed lines from ammonia building to metering stations, storm water pollution prevention, site restoration, pavement repair, SCADA, PLC replacement, electrical, training, iFIX software development, spare parts, documentation, maintenance of plant operations, start up, testing, site restoration and ancillary components for a complete in place and operating system	LS	1		

Item No.	Spec Ref.	Base Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in figures
6	01110	Construction of Chlorine feed improvements as shown on the contract drawings and specified, including but not limited to, demolition, all site preparation, excavation, protection of existing structures, sawcutting, backfill, compaction, concrete pavement, removal of chlorine feed PLC control panel and booster pump combination starters (4), installation of new PLC control panel and booster pump combination starters, removal and replacement of chlorine building general PLC and back panel components, buried piping, exposed piping, pipe fittings, pipe connections, pipe supports, valves, instruments, protective coatings, electrical, instrumentation, SCADA, PLC replacement, training, iFIX software, spare parts, documentation, maintenance of plant operations, start up, testing, site restoration and ancillary components furnished complete in place and fully operational system	LS	1		

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Item No.	Spec Ref.	Base Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in figures
7	01110	Installation of a new Softstart for each booster pump as shown on the contract drawings and specified, with S7-1214 PLC, PS, relays, SPD, terminals, wiring and communication interfaces to connect the local PLC to the plant master PLC and communication for local and remote monitoring, providing PLC and HMI programming to monitor and control equipment and system by the existing panel and added ammonia and chlorine control functions, installation of new GE Multilin 469 for each booster pump, demolition of existing VFDs, and ancillary components for a complete in place and operating system	LS	1		
<u>TOTAL BASE UNIT PRICES</u>						

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C. EXTRA UNIT PRICE TABLE:

Item No.	Spec Ref.	Extra Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in figures
8	02318	Excavation Around Obstructions	CY	100	\$15.00 ⁽²⁾	\$1,500.00 ⁽²⁾
9	02318	Extra Hand Excavation	CY	100	\$20.00 ⁽²⁾	\$2,000.00 ⁽²⁾
10	02318	Extra Machine Excavation	CY	100	\$15.00 ⁽²⁾	\$1,500.00 ⁽²⁾
11	02318	Extra Placement of Backfill Material	CY	100	\$15.00 ⁽²⁾	\$1,500.00 ⁽²⁾
12	02318	Extra Cement Stabilized Backfill Material	CY	100	\$25.00 ⁽²⁾	\$2,500.00 ⁽²⁾
13	03310	Extra Class "A" Concrete In Place	CY	100	\$50.00 ⁽²⁾	\$5,000.00 ⁽²⁾
14	03211	Extra Grade 60 Reinforcing Steel In Place	LB	100	\$3.00 ⁽²⁾	\$300.00 ⁽²⁾
15	01110	Extra relocation of/replacement of underground Ammonia /Chlorine piping, all sizes, all types, including fittings	LF	200	\$10.00 ⁽²⁾	\$2,000.00 ⁽²⁾
16	01110	Extra relocation/replacement of electrical duct bank as directed by City Project Manager, all sizes	LF	100	\$50.00 ⁽²⁾	\$5,000.00 ⁽²⁾
17	01110	Extra PVC Pipe and Fittings 1" to 3" diameter, installed complete	LF	100	\$4.50 ⁽²⁾	\$450.00 ⁽²⁾
18	01110	Extra Vinylester FRP pipe supports, 1" to 4" diameter, installed complete	EA	15	\$10.00 ⁽²⁾	\$150.00 ⁽²⁾
19	01110	Extra Small Chlorine Booster Pump replacement in kind, installed complete and operational	EA	2	\$5,000.00 ⁽²⁾	\$10,000.00 ⁽²⁾
20	01110	Extra Large Chlorine Booster Pump replacement in kind, installed complete and operational	EA	2	\$7,500.00 ⁽²⁾	\$15,000.00 ⁽²⁾
21	01110	Replacement of additional 24" x 24" Fissured Acoustic Ceiling boards as directed by City Project Manager	EA	20	\$50.00 ⁽²⁾	\$1,000.00 ⁽²⁾

Item No.	Spec Ref.	Extra Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in figures
22	01110	Replace existing fire alarm control panel and associated devices for the pump station building, compliant with current code requirements complete, in place, and operational. Reuse existing devices, wiring, conduits, and raceways where possible, replace in kind as needed. Connect existing smoke detectors to the new fire alarm control panel. Submit a deferred fire alarm system design, equipment cut sheets, and O&M manual prepared by a licensed fire alarm design consultant. Obtain permit from the City of Houston Permit Office prior to installation.	LS	1	\$20,000.00 ⁽²⁾	\$20,000.00 ⁽²⁾
<u>TOTAL EXTRA UNIT PRICES</u>						\$67,900.00 ⁽²⁾

D. CASH ALLOWANCE TABLE:

Item No.	Spec Ref.	Cash Allowance Short Title	Cash Allowance in figures (1)
23	01110	City of Houston Building Permit	\$20,000 ⁽¹⁾
<u>TOTAL CASH ALLOWANCES</u>			\$20,000 ⁽¹⁾

E. ALTERNATES TABLE:

Item No.	Spec Ref.	Alternate Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total Price for Alternate in figures
N/A		N/A				\$0.00
<u>TOTAL ALTERNATES</u>						\$0.00

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F. TOTAL BID PRICE:

(Add Totals for Items A., B., C., D., and E. above)

\$ _____

2.0 SIGNATURES: By signing this Document, I agree that I have received and reviewed all Addenda and considered all costs associated with the Addenda in calculating the Total Bid Price.

Bidder:

(Print or type full name of your proprietorship, partnership, corporation, or joint venture.)

****By:**

Signature

Date

Name:

(Print or type name)

Title

Address:

(Mailing)

(Street, if different)

Telephone and Fax Number:

(Print or type numbers)

* If Bid is a joint venture, add additional Bid Form signature sheets for each member of the joint venture.

** Bidder certifies that the only person or parties interested in this offer as principals are those named above. Bidder has not directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding.

Note: This document constitutes a government record, as defined by § 37.01 of the Texas Penal Code. Submission of a false government record is punishable as provided in § 37.10 of the Texas Penal Code.

Footnotes for Tables B through E:

- (1) Fixed Unit Price determined prior to Bid. Cannot be adjusted by the Bidder.
- (2) Minimum Bid Price determined prior to Bid. Can be increased by the Bidder by crossing out the Minimum and noting revised price on the line above.
- (3) Maximum Bid Price determined prior to Bid. Can be decreased by Bidder by crossing out the Maximum and noting revised price on the line above.
- (4) Fixed Range Bid Price determined prior to Bid. Unit Price can be adjusted by Bidder to any amount within the range defined by crossing out prices noted and noting revised price on the line above.

END OF DOCUMENT

Section 01110

SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Summary of the Work including Project Description, Work Covered by Contract Documents, Definition, Cash Allowances, Incentive Allowances, City-furnished Products, Salvaged Materials and Equipment Work Sequence, Coordination of Work, Contractor Use of Premises, Street Cut Ordinance, Warranty, Interpretation Of Conflicts, General Construction Notes, Existing Utilities, Water Lines, Storm Sewer, Sanitary Sewer, Storm Water Pollution Prevention Plan, Alternate Construction Methods, Additional Conditions For Substantial Completion, Pipelines, Soil Conditions & Environmental Site Assessments (ESA), Potentially Petroleum Contaminated Areas, Safety Systems, Utility Service Lines, CenterPoint Energy Electrical Facilities, CenterPoint Energy Underground Gas Facilities, AT&T/SBC (Telephone Facilities), Tree Protection, Equipment Training, Products, and Execution.

1.02 PROJECT DESCRIPTION

- A. The project includes the work shown on the drawings and specified in the Project Manual, including, but not limited to new/replacement of ceiling tiles, A/C system, flooring and painting walls in Main Office/Control Room/Switch Gear Rooms, ammonia feed improvements, chlorine feed modifications, climate controlled enclosure for generator switch gear, emergency eyewash/shower, and replacement of existing VFD's with soft starts and associated structural, mechanical, electrical and instrumentation components.

1.03 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work of this contract is for the improvements to the Southwest Pump Station consisting of the following Base Bid Items:
 - 1. Mobilization as specified in Section 01520.
 - 2. Replacement of existing rolled linoleum flooring with new terrazzo cast in-situ flooring with integrated terrazzo cove base, paint walls with premium quality latex paint, new ceiling tiles, new AC system, electrical and mechanical relocations in office, control room and switch gear rooms as shown on the contract drawings and specified.

SUMMARY OF WORK

3. Construction of generator switchgear enclosures as shown on the contract drawings as specified, including but not limited to demolition of exterior wall and louvers, new dry wall, new ceiling, new louvers, new A/C system, electric service, and ancillary components for a complete in place and operating system.
4. Emergency Eyewash/shower as shown on drawings and specified including plumbing complete in place and an operating system
5. Construction of Ammonia feed improvements as shown on the contract drawings and specified, including but not limited to, all site preparation, excavation, protection of existing structures, backfill, compaction, removal of old ammoniator and appurtenances, installations of three (3) new ammoniators, one (1) new booster pump, two (2) magnetic flow meters, associated piping, pipe fittings, pipe supports, valves, wall penetrations, instruments, protective coatings, electrical, instrumentation, metal fabrications, removal and replacement of two (2) FRP ammonia storage tanks including concrete saddles and associated piping, removal of two (2) existing ammonia day tanks and demolition of foundations, re-installation of two (2) ammonia day tanks including new foundations, applying protective coatings for day tank concrete foundations, existing trenches and floor to an extent as indicated per plans, removal and replacement of ammonia feed lines from ammonia building to metering stations, storm water pollution prevention, site restoration, pavement repair, SCADA, PLC replacement, electrical, training, iFIX software development, spare parts, documentation, maintenance of plant operations, start up, testing, site restoration and ancillary components for a complete in place and operating system
6. Construction of Chlorine feed improvements as shown on the contract drawings and specified, including but not limited to, demolition, all site preparation, excavation, protection of existing structures, sawcutting, backfill, compaction, concrete pavement, removal of chlorine feed PLC control panel and booster pump combination starters (4), installation of new PLC control panel and booster pump combination starters, removal and replacement of chlorine building general PLC and back panel components, buried piping, exposed piping, pipe fittings, pipe connections, pipe supports, valves, instruments, protective coatings, electrical, instrumentation, SCADA, PLC replacement, training, iFIX software, spare parts, documentation, maintenance of plant operations, start up, testing, site restoration and ancillary components furnished complete in place and fully operational system.

7. Installation of a new Softstart for each booster pump as shown on the contract drawings and specified, with S7-1214 PLC, PS, relays, SPD, terminals, wiring and communication interfaces to connect the local PLC to the plant master PLC and communication for local and remote monitoring, providing PLC and HMI programming to monitor and control equipment and system by the existing panel and added ammonia and chlorine control functions, installation of new GE Multilin 469 for each booster pump, demolition of existing VFDs, and ancillary components for a complete in place and operating system.

B. Work of this contract is for the improvements to the Southwest Pump Station consisting of the following Extra Unit Price Bid Items:

1. Excavation Around Obstructions as directed by the City Project Manager
2. Extra Hand Excavation as directed by the City Project Manager
3. Extra Machine Excavation as directed by the City Project Manager
4. Extra Placement of Backfill Material as directed by the City Project Manager
5. Extra Cement Stabilized Backfill Material as directed by the City Project Manager
6. Extra Class "A" Concrete In Place as directed by the City Project Manager
7. Extra Grade 60 Reinforcing Steel In Place as directed by the City Project Manager
8. Extra relocation of/replacement of underground Ammonia /Chlorine piping, all sizes, all types, including fittings as directed by the City Project Manager
9. Extra relocation/replacement of electrical duct bank including trenching, rebar, concrete encasement and backfill as directed by Engineer, all sizes as directed by the City Project Manager
10. Extra PVC Pipe and Fittings 1" to 3" diameter, installed complete as directed by the City Project Manager
11. Extra Vinylester FRP pipe supports, 1" to 4" diameter, installed complete as directed by the City Project Manager

SUMMARY OF WORK

12. Extra Small Chlorine Booster Pump replacement in kind, installed complete and operational as directed by the City Project Manager
13. Extra Large Chlorine Booster Pump replacement in kind, installed complete and operational as directed by the City Project Manager
14. Replacement of 24" x 24" Fissured Acoustic Ceiling boards as directed by the City Project Manager
15. Extra Unit Price Item for the replacement of existing fire alarm control panel and associated devices for the pump station building, compliant with current code requirements complete, in place, and operational. Reuse existing devices, wiring, conduits, and raceways where possible, replace in kind as needed. Connect existing smoke detectors to the new fire alarm control panel. Submit a deferred fire alarm system design, equipment cut sheets, and O&M manual prepared by a licensed fire alarm design consultant. Obtain permit from the City of Houston Permit Office prior to installation.

C. Work of this contract is for the improvements to the Southwest Pump Station consisting of the following Cash Allowance Items:

1. Obtain all applicable permits from the City of Houston.

D. General Requirements:

1. The completed work shall not lack any part which can be reasonably implied as incidental for proper and useful operation of the facility. This includes all items of equipment, labor, and materials, whether or not shown in the Contract Documents, where such items are required to fulfill the intent of the Contract, and all shall be in accordance with code requirements, standards of regulatory agencies, manufacturer's recommendations, and acceptable industry practice.
2. The Contractor shall provide a superintendent who can act on behalf of the Contractor to be on site or be available at all times while work is underway.
3. Although some minor items may not be specifically identified by quantity or description, they shall be considered a part of the work and shall be included in the applicable Proposal Item with which they are a component part.

4. The need for and use of any labor or material not specifically described but necessary to complete the project described by the Contract Documents shall not represent a claim for extra payment.
5. The Contract Time allowed for Substantial Completion shown in Section 00410-A includes time required for the Contractor to provide and install all base bid and owner allowance items, as well as all extra unit price items that the Owner chooses to authorize. Owner authorization of extra unit price items shall not be considered as a basis for extending the Contract Time.

1.04 DEFINITION

- A. Large Diameter Water Lines: Water Lines 24-inches in diameter and larger. References to large diameter water lines shall apply to pipe, valves and appurtenances 24-inch and larger.
- B. Small Diameter Water Lines: Water Lines 20-inches in diameter and smaller. Unless otherwise noted in the Contract Documents, requirements pertaining to large diameter water lines do not apply to pipe valves and appurtenances 20-inches in diameter and smaller.

1.05 CASH ALLOWANCES

- A. Include the following specific Cash Allowances in the Contract Price under provision of Document 00700 - General Conditions, Paragraph 3.11.
 1. City of Houston Permits: Allow stipulated amount for the City of Houston Building Permits as required by Code Enforcement.

1.06 INCENTIVE ALLOWANCES

- A. None

1.07 CITY FURNISHED PRODUCTS

- A. Item Furnished by City for Installation and Final Connection by Contractor:
 1. None

1.08 SALVAGED MATERIALS AND EQUIPMENT

- A. City will designate materials and equipment to be salvaged prior the demolition process. Items noted for salvage shall be removed, lightly cleaned, and delivered to a City designated facility by Contractor.

SUMMARY OF WORK

WBS No. S-001000-0047-4

- B. Contractor shall notify City 14 calendar days prior to demolition activities and request a list of the items to be salvaged.

1.09 WORK SEQUENCE

- A. Perform critical locates per Contract Drawings within 10 days from Notice to Proceed. Field verify dimensions and conditions before commencing work. Report any discrepancies to Project Manager before commencing work. Submit documentation of work completion to the Project Manager.
- B. Southwest Pump Station is an active facility. The operation of Southwest Pump Station is interconnected with other facilities. Coordination is required with other active projects including Southwest Pump Station Improvements Package I (WBS No. S-001000-0033-4), Southwest Pump Station Valves Phase 3 and 66-inch Richmond Line Rehabilitation (WBS No. S-000901-0009-3) and 30-inch Water Line from Southwest Pump Station To Mid Lane (WBS No. S-000900-0175-4).

1.10 COORDINATION OF WORK

- A. Coordination of the Work: Refer to Section 01312 – Coordination and Meetings.
- B. Work requiring access to City of Houston Water Facilities:
 - 1. See Attachment A
- C. Schedule the Work with any other contractors of any trade of discipline working adjacent to and on the project site prior to and during construction.
- D. Schedule construction operations with City Project Manager, Traffic Management, Maintenance Division, and private utilities.
- E. Schedule testing and inspection of cathodic protection system and protective coatings for pipe, valves, and tanks with the City's Design Engineering Contractor. Contact David Pedersen at 832-395-3833.

1.11 CONTRACTOR USE OF PREMISES

- A. Comply with procedures for access to site and Contractor's use of rights-of-way as specified in Section 01145 - Use of Premises
- B. Construction Operations are limited to City's property, rights-of-way or easements.

- C. Utility Outages and Shutdown: Provide notification to City and private utility companies (when applicable) a minimum of 48 hours, excluding weekends and holidays, in advance of required utility shutdown. Schedule all work as required.
- D. Work to be done to lines, grades, elevations, and locations as shown on Drawings.
- E. Prevent overstress of any structure, and any part or member of it, during construction. This applies to existing work and structures affected by operations. Check effect of operations in this regard, and provide temporary supports and connections required to assure safety and stability of both new and existing work and to prevent overstress of any part.
- F. Coordinate activity schedule and extend full cooperation to other contractors who have responsibilities either concurrent with, proceeding or following this Contractor's time along work site. Ensure availability of access, availability of selected portions of this area to others and provide appropriate information for planning purposes to other contractors.
- G. Maintain local driveway access to residential and commercial properties adjacent to work areas. Provide temporary driveway access to driveways in accordance with Section 01555 – Traffic Control and Regulation and Section 01145 – Use of Premises. Coordinate with business owners and residents.
- H. City's Utility Maintenance Division is not bound to assist the Contractor in locating existing utilities during construction. Contractor must verify location of existing utility lines prior to commencement of pipe laying operations.
- I. Working multiple and separate crews during construction is allowed, as approved by Project Manager.
- J. Field Office:
 - 1. A Field Office is required on this project. See Section 01520 – Temporary Field Office.
- K. Work within City of Houston Water Facilities:
 - 1. Construction within the pump station site: Contractor's activities are limited to actual work on site. Field offices will not be allowed within the City property. Contractor is not allowed on plant site despite obtaining permitted documents, until appropriate materials are

SUMMARY OF WORK

secured or readily available unless otherwise approved by Project Manager. Submit necessary security requirements per Document 01110 - Attachment A.

2. Materials and equipment for plant work only may be stored on site immediately prior to use and unused materials must be removed immediately. Material and equipment for non-plant work may not be stored on site. Do not block access drives with material.
3. Maintain access to City of Houston Operations & Maintenance personnel at all times. Contractor must relocate materials and equipment at the request of City personnel without notice and at no additional cost.
4. Driveways, Walkways and Entrances: Keep driveways parking, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials
5. Schedule deliveries to minimize use of driveways and entrances by construction operations.
6. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
7. Critical Stages of Work requiring shut down or limited operation of facilities to be performed during low water demand months (November through March). Comply with provisions of City of Houston Code of Ordinances, Section No. 40-28. A minimum of 72 hours of written notification is required before shutting down plants. Critical Stages of Work must be performed in presence of Project Manager and Drinking Water Operation Division's project manager.
8. City of Houston and Owner's representative requires background information on any and all workers present on site.
9. Submit proposed Site Utilization Plan for designated construction parking, lay down area, SWPPP (if required), and temporary fences. No separate pay.
10. Contact Mr. Sandeep Aggarwal at City of Houston CIP/Infrastructure Group at (832) 395 3858 to access plant site.

1.12 STREET CUT ORDINANCE (NOT USED)

1.13 WARRANTY

- A. Comply with warranty requirements in accordance with Document 00700 General Conditions.

1.14 INTERPRETATION OF CONFLICTS

- A. Should conflicts occur in Contract Documents, request interpretation before proceeding with Work. Such requests shall first be preceded by a diligent investigation into Contract Documents. Contain evidence of such investigation in requests for interpretation.

1.15 GENERAL CONSTRUCTION NOTES

- A. Notify the Utility Coordinating Committee at 1-800-669-8344 or (713) 223-4567, and the City of Houston Department of Public Works and Engineering, Civil Construction at (713) 837-7196, at least 48 hours prior to commencement of work.
- B. Field verify existing facilities shown on the drawings by whatever means necessary (metal detection, probes, excavation, survey, others) prior to excavation for proposed utilities. Field verification work and utility adjustments shall be completed prior to excavation for proposed utilities. No separate pay item.
- C. Call the Traffic Management and Maintenance Division of the City of Houston Public Works and Engineering Department when work is scheduled near signal conduits within the City of Houston (713) 837-7280. Call at least five working days in advance.
- D. These plans and the surveys upon which they are based are tied into the official City of Houston survey system in compliance with ordinance No. 69-1978. City of Houston survey markers and monuments referenced have been included in this plan set.
- E. Comply with OSHA Regulations and State of Texas laws concerning excavation, trenching and shoring as specified in City of Houston Ordinance No. 87-1457.
- F. Conduct construction operation under this contract in conformance with the erosion control practices described in Document 01410 "TPDES Requirements" and Document 01570 "Storm Water Pollution Control" and the Storm Water Pollution Prevention Plans included in the construction

SUMMARY OF WORK

drawings. Work identified in this project falls under Large Construction Activity with area disturbed to be one or more acres but less than five acres. TPDES requirements applicable to Large Construction Activity will apply.

- G. Any pavement (such as wheel chair ramps, pavement curbs, sidewalks, driveways, bikeways, etc.), fences, gates, lawns, irrigation utilities, landscapes, culverts, inlets, manholes, signs or mail boxes and other improvements that have been disturbed due to utility construction shall be replaced with same quality material or better, according to City of Houston standard specifications. Contractors are required to bid accordingly.
- H. The Contractor shall be responsible for verifying the location(s) of all underground utility lines in the areas on proposed construction before beginning construction.
- I. The information contained within the project Drawings with regards to the existing facilities was taken from the original construction plans with the original work shown light and proposed work shown dark. Original work shown light is for the Contractor's information only. Its accuracy is not guaranteed and its use in no way relieves the contractor or others of any responsibility for loss due to inaccuracies. Refer to Specification Section 00330 Existing Conditions for additional detail.
- J. Contractor shall be responsible for providing required security to protect his own property, equipment and work in progress as defined in Section 01560.
- K. Contractor shall be responsible for adequately protecting existing structures, utilities, trees, shrubs, and other adjoining facilities and repair or replace due to damage caused by Contractor.
- L. Contractor shall field verify all dimensions and conditions before commencing work. All landscaping features shall be field verified. It shall be the Contractor's responsibility to report any discrepancies to the Construction Manager in a timely manner.
- M. Contractor to keep access road to existing plants open and free of construction related debris at all times. Contractor staging area shall be used for Contractor's personnel, parking, material, and storage. Stockpile, material fabrication and related construction uses will not be allowed to interfere with normal plant operation. Contractor to provide temporary all-weather access roads as needed to maintain access to all unloading areas, throughout the duration of the project.
- N. The Contractor to give notice to all authorized inspectors, superintendents or persons in charge of private and public utilities affected by his operations prior to commencement of work.

- O. Obtain all required construction permits prior to commencement of work.
- P. Plant coordinates shown for proposed structure locations are referenced to outside of face of exterior wall or to centerline of structure, unless otherwise noted on the Drawings.
- Q. The finished grade elevations shown are intended to provide drainage away from plant facilities. Minor changes may be necessary to provide adequate drainage.
- R. Maintain drainage of site during all phases of construction. Do not block drainage from adjacent areas or add flow to adjacent areas.
- S. These Drawings, prepared by KIT Professionals Inc., Gupta & Associates, Inc. and S&K Architects and Planners Inc., do not extend to or include designs or systems pertaining to the safety of the construction Contractor or its employees or agents. KIT Professionals Inc.'s, Gupta & Associates, Inc.'s and S&K Architects and Planners Inc.'s registered professional engineer(s) or architect(s) that have sealed these bid documents does not extend to any such safety systems that may now or hereafter be incorporated in these Drawings. The construction Contractor shall prepare or obtain the appropriate safety systems required by Federal, State, and local laws and regulations.
- T. The Contractor shall contact the following, a minimum of 48 hours prior to beginning construction:
 - 1. Texas One Call (800) 245-4545
 - 2. CenterPoint Energy (800) 669-8344
 - 3. Lone Star Notification Center (713) 223-4567
- U. Contractor shall not operate existing valves plant appurtenances or plant equipment unless, in the presence of the City Construction Manager and/or City Drinking Water Operations. Provide sufficient notification and lead time, in accordance with the requirements of Section 01114 and 01732, for Plant Operator where it becomes necessary to actuate or de-actuate valves, plant appurtenances, or plant equipment unless in the presence of City DWO personnel or Construction Manager.
- V. Plant Manager and Construction Manager to be notified in advance of any existing process equipment "shutdown", as specified in Section 01114.
- W. Contractor to provide adequate restrained joints as scheduled or concrete thrust blocking at all tees, wyes, bends, crosses, flushing valves and offsets to withstand test pressure as specified.

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- X. Contractor shall comply with all Federal, State, and local laws and regulations of utility companies concerning safety and health practices.
- Y. Contractor shall provide sodding in all areas disturbed as a result of construction operations that are not covered by structures or pavement. Temporary roadways shall be removed at the conclusion of the project, and site will be restored to its original conditions.
- Z. Piping drawings indicate invert elevations for gravity flow lines. Slope pipe uniformly between elevations shown. No valleys or peaks permitted in gravity flow lines. For other piping, refer to detail sheets for pipe elevations at each structure. Yard piping drawings do not indicate vertical bends and transitions. When necessary, make vertical transitions or furnish and install vertical bends at no extra cost. Do not exceed manufacturer's recommendations for curvature of lines and/or deflection of pipe joints. All vertical transitions and bends to be documented on required "red line drawings."
- AA. Yard piping locations shown are approximate. Field verify locations of existing pipe. Arrange new piping as necessary to avoid interference and provide clearance noted. All changes in piping shown, to be documented on required "red line drawings."
- BB. Maintain minimum clearance of 3 feet from edge of structures to closest edge of pipeline adjacent and parallel to edge of structure unless otherwise noted on plans.
- CC. The Contractor to provide tape, fittings, plugs, and other devices for use in filling, flushing, testing, etc. (no separate pay).
- DD. Overhead lines exist along the plant boundary. Contractor to locate them prior to beginning any construction. Texas Law, Session 752, Health and code governing any activities which may cause people or objects to approach live overhead high-voltage lines shall be strictly adhered to. Contractor is legally responsible for safety of construction workers under this law. This law carries both criminal and civil liability.
- EE. The Contractor shall not operate any equipment or have any persons within 10 feet (vertical and horizontal) of electrical power lines.
- FF. Contractor shall refer to the City of Houston standard detail drawings included in the City of Houston's "Standard Construction Details for Wastewater Collection Systems, Water Lines, Storm Drainage, and Street

Paving", dated January 10, 2011 for any details not included in the construction drawings.

GG. Enter equipment data of new and rehabilitated/repared/refurbished material and/or equipment, provided on this project into the City's Work Management System (WMS) database inclusive of ALL template Excel spreadsheet worksheets and examples. Within the provided CD-ROM under the front cover is a copy of the City's WMS typical equipment data sheet. This activity needs to be coordinated with Drinking Water Operations (DWO) staff for training and data input. This work is not paid as a separate line item, but is included in the costs for items 1.02.A.1-9 described above.

1.16 EXISTING UTILITIES

- A. Underground utilities exist in the vicinity of this project. While every effort has been made to show locations for existing utilities, they are approximate and other utilities may exist in the vicinity of this project, which are not shown on these plans. The location and grades of existing utilities are based on as-built information.
- B. Public and private utility lines and customer service lines may exist that are not shown on the construction drawings. Locate, maintain and protect the integrity of these lines. Hand excavation may be required.
- C. Coordinate with the proper utility company to relocate or divert any utility in conflict with proposed construction so as not to disrupt service of same. Restore relocated or diverted utility to its original condition and location upon completion of construction.
- D. Do not interrupt existing water service. Proposed water lines shall be constructed and service transferred per City of Houston requirements prior to the commencement of any underground construction that may interfere with existing water service.
- E. Maintain existing water service and sanitary sewer service within construction area until construction of the new system is complete.
- F. Determine the sizes of water meters that are found in field.

1.17 WATER LINES

- A. Water lines shall be constructed in accordance with current City of Houston specifications for large diameter water lines.
- B. All utilities present on these drawings are shown at approximate locations based on the best available information. The contractor shall field

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determine the exact locations prior to commencing construction. He or she shall be fully responsible for any and all damages caused by his or her failure to exactly locate and maintain these underground utilities, at no additional cost to the City of Houston.

1.18 STORM SEWER

- A. Adequate drainage shall be maintained at all times during construction and any drainage ditch or structure disturbed during construction shall be restored to the satisfaction of the owning authority. All construction storm runoff shall comply with the final draft of the Storm Water Management Handbook for construction activities, as prepared by Harris County, HCFCD and the City of Houston in compliance with NPDES requirements.
- B. During any storm sewer and/or lead replacement, pull to the last full joint.
- C. Contractor shall be responsible for removal of siltation in existing and proposed storm sewer systems (if necessary) that result from construction activities associated with this project.

1.19 SANITARY SEWER

- A. The contractor is fully responsible for damages to the existing sanitary sewer facilities as a result of this project. Sanitary sewers shall be constructed in compliance with the latest city specifications for sewer construction, and tested as specified in the city test procedure for either liquid or air, including all amendments and revisions thereto. Embedment and backfill for sanitary sewers shall be placed in accordance with City of Houston standard drawing unless otherwise noted.
- B. Maintain service to all sewers during construction. Contractor is responsible for locating all sanitary sewer service laterals affected by construction. The city does not warranty the location or number or any sanitary leads shown in plans.
- C. If a damaged sanitary sewer line is being replaced as a result of this construction, the transfer of service stubs from the existing to the proposed sanitary sewer must be included. Any stubs that are determined to be damaged by the project inspector shall be removed and replaced to the right-of-way line.

1.20 STORM WATER POLLUTION PREVENTION PLAN

- A. The Storm Water Pollution Prevention Plan for this project is governed by Section 01410 TPDES Requirements and the layouts provided in the

construction drawings. Comply with Storm Water Pollution Prevention Plan as detailed in the construction documents.

1.21 ALTERNATE CONSTRUCTION METHODS

- A. Alternate construction methods will be allowed in accordance with applicable details and specifications in Contract Documents at no additional cost to City of Houston provided City will receive substantial benefit from alternate construction method(s). Contractor accepts responsibility for all additional cost of investigations and incidental items, including any re-design that may be necessary. Submit modifications for review by City Engineer prior to commencement of any fabrication/construction activity if such alternate construction methods are to be considered. All modifications must be signed and sealed by a Licensed Professional Engineer registered in State of Texas prior to submittal to City Engineer. Failure of agreement between Contractor and Project Manager over proposed alternate construction methods would require construction as per original contract documents.

1.22 ADDITIONAL CONDITIONS FOR SUBSTANTIAL COMPLETION

- A. In addition to requirements outlined in Document 00700 – General Conditions, for Contractor to be substantially complete with the Work and call for inspection, the Project Manager to confirm the following conditions have been met or completed:
1. Draft O&M manuals shall be delivered to Project Manager.
 2. Training shall be conducted utilizing draft O&M manuals.
 3. All safety-related systems and equipment shall be installed, accepted by manufacturer's representative and approved for use.
 4. Testing and demonstration of satisfactory control functions associated with Ammonia and Chlorine feed control system components.
 5. All pay items shall be complete.
 6. All safety related work including pavement striping, signing, and signalization to be complete.

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1.23 PIPELINES

- A. Refer to Specification Section 02317- Excavation and Backfill for Utilities for specific requirements on excavating near pipelines.

1.24 SOIL CONDITIONS & ENVIRONMENTAL SITE ASSESSMENTS (ESA)

- A. Bidder(s) must consider the soil conditions and ESA findings provided in the Geotechnical Report and ESA Phase 1 Report, respectively. These reports have been provided on a CD, which is attached to the Project Manual.

1.25 POTENTIALLY PETROLEUM CONTAMINATED AREAS

- A. During proposed Work, the Contractor is responsible to inform the Project Manager of any observed soil contaminations. Where soil contamination exists, test the soil and take proper action as described in Section 02105 and Section 02120.

1.26 SAFETY SYSTEMS

- A. The plans and any attendant drawings (including shop drawings, as built drawings or record drawings), addenda, change orders and specifications, prepared for this project do not extend to or include designs or systems pertaining to the safety of the construction contractor or its employees, agents, or representatives in their performance of the work. The seals of the registered/licensed professional engineers hereon do not extend to any such safety systems that may now or hereafter be incorporated in these plans. The construction contractor shall prepare or obtain the appropriate safety systems, including the plans and specifications required by House Bill 662 and 665 enacted by the Texas Legislature.

1.27 UTILITY SERVICE LINES

- A. Public utility service lines (water and sanitary sewer) are not shown on the drawings. Contractor shall anticipate that such service lines exist and repair them if damaged during construction. No separate pay will be made for repairs. The cost shall be incidental to the work.

1.28 CENTERPOINT ENERGY ELECTRICAL FACILITIES

- A. Overhead lines may exist on property. We have not attempted to mark those lines since they are clearly visible. All lines should be located prior to construction. Texas law, section 752, health & safety code, forbids all activities in which persons or things may come within six (6) feet of live overhead high voltage lines. Parties responsible for work, including

contractors, are legally responsible for safety of construction workers under this law. This law carries both criminal and civil liability. To arrange for lines to be turned off or removed call Centerpoint Energy at (713) 207-2222.

- B. Location of CenterPoint Energy electrical facilities , are approximate and have not been verified by actual field check
- C. Hand dig with in one (1) foot of CenterPoint Energy underground electrical facilities.
- D. Overhead lines exist on and adjacent to the project site, which may be live during the construction period. Facilitate work so as not to interrupt services unless permitted by CenterPoint Energy.
- E. Exercise caution when working in the vicinity of CenterPoint Energy electrical cable, underground wiring and overhead lines.
- F. When excavation within 5 feet and beneath a depth of 3 feet below existing grade of a utility pole or anchor to which CenterPoint Energy facilities are attached, CenterPoint Energy will secure or brace these poles and anchor prior to excavation. The cost of CenterPoint Energy's efforts is incidental. "No separate pay item"

1.29 CENTERPOINT ENERGY UNDERGROUND GAS FACILITIES

- A. Locations of Center Point Energy main lines (to include Unit Gas Transmission and/or Industrial Gas Supply Corporation where applicable) are shown in an approximate location only. Service lines are not usually shown. The contractor shall contact the Utility Coordinating Committee at (713) 223-4567 or 1-800-669-8344 a minimum of 48 hours prior to construction to have main and service lines field located.
- B. When Center Point Energy pipeline markings are not visible, call (713)967-8037 (7:00 am to 4:30 pm) for status of line location request before excavation begins.
- C. When excavating within eighteen inches (18") of the indicated location of CenterPoint Energy facilities, all excavation must be accomplished using non-mechanized excavation procedures.
- D. When Center Point Energy facilities are exposed, sufficient support must be provided to the facilities to prevent excessive stress on the piping.

SUMMARY OF WORK

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- E. The contractor is fully responsible for any damages caused by his failure to exactly locate and preserve these underground facilities.
- F. All gas facilities are the property of CenterPoint Energy, unless otherwise noted.

1.30 AT&T SBC (Telephone Facilities)

- A. The locations of SBC utilities are shown in an approximate way only. The contractor shall determine the exact location before commencing work. He agrees to be fully responsible for any damages and all damages, which might be occasioned by his failure to exactly locate and preserve these underground utilities.
- B. Call 1-800-344-8377 a minimum of 48 hours prior to construction to have underground lines field located.
- C. When excavation within eighteen inches (18") of an indicated location of SBC facilities, all excavations must be accomplished by using non-mechanized excavation procedures. When boring, the contractor shall expose SBC facilities.
- D. When SBC facilities are exposed, the contractor will provide support to prevent damage to the conduit ducts or cables. When excavating near telephone poles, the contractor shall brace the pole for support.

1.31 TREE PROTECTION – Not Used.

1.32 EQUIPMENT TRAINING

- A. Contractor shall provide training for all new equipment in accordance with the requirements of the individual specification sections.
- B. Training shall include classroom instruction and field operation and maintenance instruction with the O&M manual(s) and other materials, slides, videos and handouts.
- C. Training shall be performed at each site upon completion of the installation and testing of the equipment per specification section requirements.

PART 2 PRODUCTS – Not Used.

PART 3 EXECUTION - Not Used.

END OF SECTION

- c. Condulet covers shall have encapsulated stainless steel thumb screws.
 - d. Condulets and covers shall be of malleable iron or ferroalloy material before coating.
 - e. Urethane coating shall be a minimum of 2 mil thickness on the interior of the conduit and the interior of fittings, condulets, covers, and bodies.
- 3. Liquidtight Flexible Metal Conduit and Fittings
 - a. Use liquidtight flexible metal conduit manufactured in accordance with UL 1 and Federal specification WW-C-566 C.
 - b. Fittings used with liquidtight flexible metal conduit shall be the PVC-coated type. Thoroughly ground the conduit to the fittings and through the fittings to the box or enclosure to which it is attached.
 - c. Couplings and fittings for use in hazardous areas shall comply with UL 886, NEC Article 501-4 (a&b), and Federal Specification W-C-586 C.
- 4. PVC Conduit and Fittings. Use PVC conduit, bends, and fittings, which comply with NEMA TC 2, W-C-A, and NBC Article 347-17 for above ground and underground installation. Conduit shall be Schedule 80.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ensure that the conduit system to be installed is sized properly for the cable and wire requirements.
- B. Verify the actual physical conduit route from the conduit plan drawings and prepare the conduit support system.
- C. Verify the equipment locations to which the conduit will be connected and determine detail requirements for connections.

3.02 INSTALLATION

- A. Install rigid aluminum conduits in dry, inside, air-conditioned locations and all outdoor locations, inside valve vaults and wet wells, areas that are not air-conditioned, and in all other corrosive and wet environments.

CONDUIT, FITTINGS, AND BODIES

Aluminum conduits shall not be installed in chlorine or caustic areas.

- B. Install PVC coated rigid galvanized steel (RGS) elbows in ductbanks incased in concrete slabs for stub-ups in chlorine and caustic locations only. Use installers certified by the manufacturer.
- C. Install PVC conduits in reinforced duct banks or encased in concrete slabs. For bends and stub-ups, use PVC coated rigid aluminum elbows as required in Section 16402. Use installers certified by the manufacturer.
- D. Run exposed conduit parallel or perpendicular to walls, ceilings or main structural members. Group multiple conduits together where possible. Conduit shall not interfere with the use of passageways, doorways, overhead cranes, monorails, equipment removal areas or working areas. In no case shall conduit routing present a safety hazard, trip hazard, or interfere with normal plant operating and maintenance procedures. A minimum overhead clearance of 8 feet shall be maintained in passageways. All conduits installed across walkways shall have concrete or aluminum trip plates installed.
- E. Installation and support of conduit shall be from steel or concrete structures in accordance with the standard detail drawings. Furnish necessary conduit straps, clamps, fittings and support for the conduit in accordance with the standard details.
- F. Identify conduit at termination points like MCC, light fixtures, control panels, receptacles, panels, and junction boxes.
- G. Not more than 3 equivalent 90 degree bends will be permitted between outlets. Provide bonded expansion fittings at building expansion joints.
- H. Install conduit runs so that they are mechanically secure, mechanically protected from physical harm, electrically continuous, and neat in appearance. The interiors of conduit shall provide clean, smooth raceways through which conductors may be drawn without damage to the insulation. Make threaded connections wrench tight.
- I. Cut conduit square with a power saw or a rotary type conduit cutter designed to leave a flat face. Do not use plumbing pipe cutters for cutting conduit. Ream the cut ends of conduit with a reamer, designed for the purpose to eliminate rough edges and burrs. Threads shall be cut with standard conduit dies providing 3/4-inch taper per foot, allowing the proper length so that joints and terminals may be made up tight and the ends of the conduit not deformed. Keep dies sharp and use a good quality threading oil continuously during the threading operation. Remove metal cuttings and oil from the conduit ends after the threads are cut and paint threads before connections are made. Use non-corrosive Carbozinc No. 11 as manufactured by the

SECTION 16402

UNDERGROUND DUCT BANKS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Underground electrical duct banks.

1.02 REFERENCES

- A. National Fire Protection Association (NFPA): No. 70 - National Electrical Code (NEC) Appendix B.

1.03 SUBMITTALS

- A. Catalog cut sheets of the ducts and spacers.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Have duct spacers and associated hardware packed and crated to avoid damage during shipment and handling.
- B. Clearly mark packages or crates stating that the material is for electrical duct banks only.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Thomas and Betts.
- B. Underground Devices Inc.
- C. Walker Division, Butler Manufacturing Company.

2.02 MATERIALS AND EQUIPMENT

- A. Conduit. Construct ducts using schedule 80 rigid PVC conduit. Refer to Section 16111 - Conduit, Fittings and Bodies.
- B. Spacers. Secure conduit with non-magnetic, universal, interlocking-type spacers for both horizontal and vertical duct arrangements.

UNDERGROUND DUCT BANKS

- C. Concrete. Use steel reinforced, red concrete as duct encasement. Refer to Section 03100 Concrete Formwork.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify from Drawings and field survey that the location of ductbanks does not interfere with any existing or new underground facilities.
- B. Verify that materials are on site in proper condition and that sufficient quantity is on hand for the work.
- C. Verify that trenches are in the correct places and prepared with sufficient depth and width to accommodate the duct banks, reinforcing rod, and concrete.
- D. Be prepared for inspection of the duct banks before reinforcing rod is installed.
- E. Before pouring concrete, verify that the ducts are free of debris and properly installed in the support and spacer systems and that the ducts are properly fitted together and firmly held in place by the hold down hardware.
- F. Provide 24-hour notice to Project Manager, Wastewater Inspectors and the Local Code Inspector for cover-up inspection before pouring electrical conduit ductbanks.

3.02 INSTALLATION

- A. Use the size and types of conduit as indicated on the Drawings for the various duct banks required for the project.
- B. Make duct bank installations and penetrations through foundation walls watertight.
- C. Assemble duct banks using non-magnetic saddles, spacers and separators. Position separators to provide 2-inch minimum concrete separation between the outer surfaces of the conduits.
- D. Provide a 3-inch minimum concrete covering on both sides, top and bottom of concrete envelopes around conduits. Add red dye at the rate of 10 pounds per cubic yard to concrete used for envelopes for easy identification during subsequent excavation.

- E. Firmly fix ducts in place during pouring of concrete. Carefully spade and vibrate the concrete to ensure filling of spaces between ducts.
- F. Make bends with sweeps of radius not less than 6 times the smallest diameter of the raceway.
- G. Make a transition from non-metallic to pvc-coated metallic rigid conduit where duct banks enter structures or turn upward for continuation above grade.
- H. Make bends of 30 degrees or more using pvc-coated metallic conduit.
- I. Reinforce duct banks throughout, where indicated on the Drawings.
 - 1. Unless otherwise noted on the Drawings, reinforce with No. 5 longitudinal steel bars placed at each corner and along each face at a maximum parallel spacing of 12 inches on centers, and No. 5 tie-bars transversely placed at 18-inch maximum longitudinal intervals.
 - 2. Maintain a maximum clearance of 2 inches from bars to the edge of the concrete encasement.
- J. Where ducts enter structures such as handholes, manholes, pullboxes, or buildings, terminate the ducts in suitable end bells, insulated L-bushings, Meyers hubs or couplings on steel conduits. Tag conduit entering pull boxes with stamped, stainless steel tags. Identify as designated in cable and conduit schedule.
- K. Do not backfill with material containing large rock, paving materials, cinders, large or sharply angular substances, corrosive material, or other materials which can damage or contribute to corrosion of ducts or prevent adequate compaction of fill.
- L. Install a bare stranded copper duct bank ground in each duct bank envelope. Make ground electrically continuous throughout the entire duct bank system. Connect ground to switchgear and MCC ground buses and to steel conduit extensions of the underground duct system.
- M. After completion of the duct bank and prior to pulling cable, pull a mandrel, not less than 12 inches long and with a cross section approximately one-fourth inch less than the inside cross section of the duct, through each duct. Then pull a rag swab or sponge through to remove any particles of earth, sand or gravel that may have been left in the duct. Repull the rag or sponge swab until the swab emerges clean.
- N. Use hemp rope to pull conductors into PVC conduit. Do not use nylon or wire cable for this purpose.

UNDERGROUND DUCT BANKS

- O. Install a warning ribbon approximately 12 inches below finished grade over underground duct banks. Refer to Section 16195 - Electrical Identification.
- P. For manholes and pull boxes below grade, install wire racks to support cables properly around the perimeter and keep them dry.
- Q. For manholes and pull boxes below grade, construct a french drain, or other drainage as detailed on the Drawings.

END OF SECTION

MECHANICAL GENERAL NOTES

1. SEE ARCHITECTURAL PLANS FOR TYPE OF CEILING AND LOCATIONS OF WALL MOUNTED DEVICES.
2. DO NOT OPERATE AIR HANDLERS OR EXHAUST FANS UNTIL ALL INTERIOR CLEANING AND PAINTING IS COMPLETE. THE CLEANING OF FOLDED COILS OR FAN ASSEMBLIES DUE TO PAINT OR CONSTRUCTION DEBRIS WILL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR.
3. RECTANGULAR DUCT SIZES INDICATED ARE ACTUAL SHEET METAL DIMENSIONS IN INCHES. ALL ROUND DUCT SIZES INDICATE NET FREE INSIDE DIAMETER AND DO NOT ACCOUNT FOR ANY INSULATION. ROUND DUCTS ARE EXTERNALLY INSULATED.
4. MAJOR EQUIPMENT SHOWN ON THE PLANS AND ELEVATIONS ILLUSTRATE THE GENERAL ARRANGEMENT AND SPACE ALLOCATION. VENT TO THE SPACE REQUIREMENTS OR EXHAUST SYSTEM COMPONENT USING MANUFACTURER IDENTIFIED SHOP DRAWINGS. PROVIDE NECESSARY ADJUSTMENTS IN EQUIPMENT LOCATION AND DUCT CONNECTIONS IN ORDER TO ACCOMMODATE THE EXISTING EQUIPMENT TO BE INSTALLED IN COORDINATION WITH ARCHITECTURAL SPACES.
5. REFER TO DETAILS FOR SUPPORTS, ANCHOR BOLTS AND HANGERS FOR ALL EQUIPMENT. OTHER MISCELLANEOUS STEEL BRACING, SUPPORTS, AND REINFORCING STEEL REQUIRED TO SUPPORT EQUIPMENT SHALL BE FURNISHED AS PART OF THE SCOPE OF WORK OF DIVISION 23.
6. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE CODES, STANDARDS AND AUTHORITIES HAVING JURISDICTION.
7. DUCTWORK AND PLenums SHALL BE SEATED IN ACCORDANCE WITH THE MECHANICAL CODE AND SMACNA METHOD AND COMMERCIAL ENERGY CONSERVATION CODE. SEAL ALL LONGITUDINAL AND TRANSVERSE JOINTS. SEAL ALL PENETRATIONS OF FLOORS, SHOVE WALLS, FIRE WALLS, AND EXTERIOR WALLS.
8. DO NOT RUN DUCT OR PIPE OVER ELECTRICAL PANELS. COORDINATE LOCATION OF DUCTS AND EQUIPMENT IN MECHANICAL ROOMS WITH THE ELECTRICAL AND PLUMBING CONTRACTOR BEFORE ANY INSTALLATION.
9. ALL DUCT RUN-OUTS TO SUPPLY AND EXHAUST DIFFUSERS AND REGISTERS, SHALL HAVE MANUAL BALANCING DAMPERS. PROVIDE YOUNG REGULATORS WITH REMOTE ADJUSTMENT WHERE CEILING IS INACCESSIBLE.
10. ALL DUCTWORK SHALL BE INSTALLED AND MANUFACTURED IN ACCORDANCE WITH LATEST SMACNA STANDARDS.
11. SECURE ALL PERMITS AND PROVIDE ANY REQUIRED TEMPORARY UTILITIES.
12. ALL FLEXIBLE DUCT SHALL BE IN CLASS I AIR DUCT PLACED INSIDE. MAXIMUM LENGTH OF FLEXIBLE DUCT SHALL NOT EXCEED 6'-0". PROVIDE RIGID ROUND LINER. AIR DUCT RADIANT AS REQUIRED. FLEXIBLE DUCT SHALL HAVE THE EQUIVALENT OF ONLY TWO 90 DEG. ELBOWS MAXIMUM. FLEX DUCTS ARE SAME SIZE AS DIFFUSER NECK.
13. THE AIR QUANTITIES SHOWN ON THE DRAWINGS FOR INDIVIDUAL OUTLETS MAY BE CHANGED TO OBTAIN UNIFORM TEMPERATURE WITHIN EACH ZONE, BUT THE TOTAL AIR QUANTITY SHOWN FOR EACH ZONE MUST BE OBTAINED.
14. INSTALL SMOKE DETECTOR FOR ALL UNITS WITH CAPACITY OF 2000 CFM AND THEREAFTER AS REQUIRED BY CODE. FIRE ALARM CONTRACTOR TO SUPPLY AND TEST UNIT.
15. ALL SUPPLY & RETURN AIR DUCTS LOCATED IN UNCONDITIONED ATTICS, OUTSIDE THE ENVELOPE, OR OUTSIDE THE BUILDING SHALL BE INSULATED USING R-8 INSULATION. EXTERIOR WALL INSULATED DUCT SHALL BE R-8 INSTALLED OR MINIMUM REQUIRED BY CURRENT HOUSTON COMMERCIAL ENERGY CONSERVATION CODE.
16. ALL SUPPLY AND RETURN DUCTS LOCATED IN A CONDITIONED SPACE OR INSIDE THE ENVELOPE SHALL BE INSULATED USING MINIMUM R-6 INSULATION (INSTALLED 2" ALLEY). EXTERNALLY INSULATED DUCT SHALL BE R-6.5 OR MINIMUM REQUIRED BY CURRENT ENERGY CONSERVATION CODE.
17. PROVIDED RECORD DRAWINGS OF THE ACTUAL INSTALLATION TO THE BUILDING OWNER OR THE DESIGNATED REPRESENTATIVE OF THE BUILDING OWNER. RECORD DRAWINGS SHALL, INCLUDING AS A MINIMUM, THE LOCATION AND PERFORMANCE DATA ON EACH PIECE OF EQUIPMENT, GENERAL CONFIGURATION OF DUCT AND PIPE DISTRIBUTION SYSTEM INCLUDING SIZES, AND THE TERMINAL AIR OR WATER DESIGN FLOW RATES.
18. PROVIDE OPERATING AND MAINTENANCE MANUALS TO THE BUILDING OWNER OR THE DESIGNATED REPRESENTATIVE OF THE BUILDING OWNER. THESE MANUALS SHALL BE IN ACCORDANCE WITH INDUSTRY ACCEPTED PRACTICES AND SHALL INCLUDE AT A MINIMUM, THE FOLLOWING:
(a) OPERATION AND MAINTENANCE MANUALS FOR EACH PIECE OF EQUIPMENT
(b) OPERATION MANUALS AND MAINTENANCE MANUALS FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE
(c) REQUIRED ROUTINE MAINTENANCE ACTIONS SHALL BE CLEARLY IDENTIFIED.
(d) NAMES AND ADDRESSES OF AT LEAST ONE SERVICE AGENCY.
(e) HVAC CONTROLS SYSTEM MAINTENANCE AND CALIBRATION INFORMATION, INCLUDING WIRING DIAGRAMS, SCHEMATICS, AND CONTROL SEQUENCE DESCRIPTIONS, DESIGNED OR FIELD-DETERMINED SET-POINTS SHALL BE PERMANENTLY RECORDED ON CONTROL DRAWINGS AT CONTROL DEVICES OR, FOR DIGITAL CONTROL SYSTEMS, IN PROGRAMMING COMMENTS.
(f) A COMPLETE NARRATIVE OF HOW EACH SYSTEM IS INTENDED TO OPERATE, INCLUDING SUGGESTED SET-POINTS.
19. DUCTWORK THAT IS DESIGNED TO OPERATE AT STATIC PRESSURES IN EXCESS OF 3 IN.W.C. SHALL BE LEAK TESTED ACCORDING TO INDUSTRY-ACCEPTED TEST PROCEDURES. REPRESENTATIVE SECTIONS TOTALING NO LESS THAN 25% OF THE TOTAL INSULATED DUCT AREA FOR THE DESIGNATED PRESSURE CLASS SHALL BE OF THE TOTAL SYSTEMS WITH THE PRESSURE RAINING SYSTEM. LEAKAGE SHALL BE IDENTIFIED ON THE DRAWINGS. THE INSULATED DUCT LEAKAGE SHALL BE NO MORE THAN 1% OF THE TOTAL AIRFLOW IN THE SECTION TESTED OR AS REQUIRED BY CURRENT COMMERCIAL ENERGY CONSERVATION CODE.
20. ALL HVAC SYSTEMS SHALL BE BALANCED IN ACCORDANCE WITH GENERALLY ACCEPTED ENGINEERING STANDARDS. A WRITTEN BALANCE REPORT SHALL BE PROVIDED TO THE OWNER OR THE DESIGNATED REPRESENTATIVE OF THE BUILDING OWNER.
21. HVAC CONTROL SYSTEMS SHALL BE TESTED TO ENSURE THAT CONTROL ELEMENTS ARE CALIBRATED, ADJUSTED, AND PROPER WORKING CONDITION AS REQUIRED BY COMMERCIAL ENERGY CONSERVATION CODE.
22. PROVIDE AND INSTALL 7-DAY PROGRAMMABLE THERMOSTAT.

